OCTOBER 1959 VOL. VIII

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OOD AND AGRICULTURE
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PLANT PROTECTION BULLETIN

A PUBLICATION OF THE WORLD REPORTING SERVICE ON PLANT DISEASES AND PESTS

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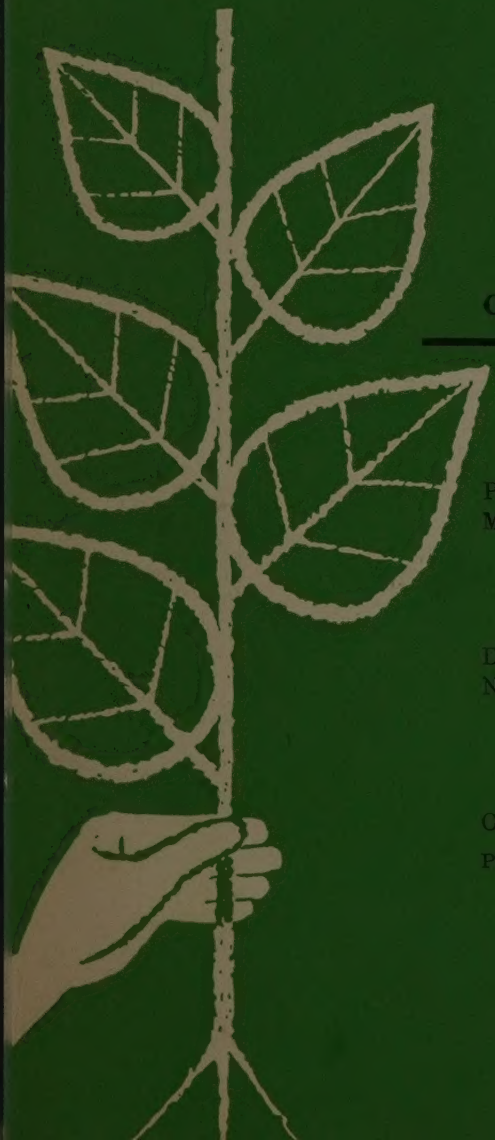

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is issued as a medium for the dissemination of information received by the World Reporting Service on Plant Diseases and Pests, established in accordance with the provisions of the International Plant Protection Convention, 1951. It publishes reports on the occurrence, outbreak and control of pests and diseases of plants and plant products of economic significance and related topics, with special reference to current information. No responsibility is assumed by FAO for opinions and viewpoints expressed in the Bulletin.

Manuscripts for publication, or correspondence regarding the World Reporting Service, should be addressed to Dr. Lee Ling, Plant Production and Protection Division, FAO, Viale delle Terme di Caracalla, Rome, Italy ; subscriptions and other business correspondence to the Distribution and Sales Section, FAO, Viale delle Terme di Caracalla, Rome, Italy.

The Bulletin is issued monthly in English, French, and Spanish, and twelve numbers, commencing with the October issue in each year, constitute a volume. Subscription rates are $5.00 or 25s. per annum ; single numbers are priced at $0.50 or 2s. 6d. The citation is FAO Plant Protection Bulletin or, in abbreviation, FAO Plant Prot. Bull.

Vol. VIII, No. 1 - October 1959

FAO PLANT PROTECTION BULLETIN

A PUBLICATION OF THE WORLD REPORTING SERVICE ON PLANT DISEASES AND PESTS

Plant Disease Investigation in the Federation of Malaya

Anthony Johnston, FAO Regional Office for Asia and the Far East, Bangkok, Thailand

Some of the plant diseases occurring in Malaya and the findings from their investigation were reviewed by W. J. Cherewick.[1] The following notes give a brief account of some of the more important plant diseases on which research has been undertaken more recently in the Plant Pathology Division of the Department of Agriculture, Federation of Malaya.

Cacao

A dieback disease of cacao, the cause of which has not yet been identified, is at present causing considerable damage. The disease is particularly severe in Trengganu but it is also found in milder form in other states. Leaves on one or more branches of affected trees are shed prematurely; such leaves are often distorted and usually show marginal necrosis. New leaves may be produced on these branches but they also soon fall off. The bare twigs remain alive and green for some time but eventually die back from the tip. Plants of all ages are attacked. Severely affected young seedlings remain small and are much weakened; in many cases death results. In older trees only individual branches are usually affected, and such trees do not die but growth is retarded and the trees are unthrifty and yield poorly.

No pathogenic fungus or bacterium has been consistently found in any part of the affected trees in association with these symptoms but examination for a possible pathogen is continuing. The possibility that the disease is caused by a virus cannot yet be ruled out and is at present also being investigated. It is considered most likely, however, that the disorder is the result of the action of some unfavorable environmental factors and, to obtain information on this aspect of the disease, plants are being grown in sand culture, leaf injection techniques are being developed, and leaf analyses are being made. The symptoms suggest that a calcium deficiency may be one of the factors involved, although application of calcium to the soil in affected areas has at best resulted in only partial recovery of the plants.

Citrus

Foot rot and brown rot gummosis, caused by a species of *Phytophthora*, probably *P. parasitica* Dastur, cause heavy losses in mandarin orange orchards. Attack is particularly severe in low-lying coastal areas of heavy clay soil where the water table tends to be at all times high. In some such areas in South Perak large orchards have been almost completely destroyed within about six years of their establishment. Heavy mortality has also occurred in Malacca.

[1] CHEREWICK, W. J. 1955. Notes on some plant diseases in Malaya. *FAO Plant Prot. Bull.* 3 : 183-184.

Mandarin orange orchards are at present all planted with marcots and the varieties used are severely attacked by the foot rot fungus. It is considered that the best way to control the disease might be the use of plants grafted on resistant stocks. Research on the disease is therefore being concentrated on the testing of different rootstocks to find a suitable resistant variety.

Coconut

A disease of unknown origin was first reported in 1957 and has been under investigation since then. In affected palms, which usually occur singly or in small groups of two or three, the first symptom to appear is the shedding of young nuts. The outer leaves then wither prematurely and die, remaining for some time hanging down around the stem. The old leaves wither more quickly than new leaves are produced, so that eventually only the central spear remains alive. Finally it also dies and the bud rots. Affected palms are killed within about six months after the appearance of the first symptoms.

So far the disease has been confined to only one district in Johore. No pathogenic fungus or bacterium has been isolated from diseased palms and it has not been possible to demonstrate any correlation between the disorder and any particular soil or other environmental factor. In an attempt to determine the cause of the disorder, field observations are being carried out to study the pattern of spread of the disease. Affected areas are being mapped and diseased palms are being inspected periodically.

Oil palm

In recent years a serious leaf-spotting disease of young oil palm seedlings has spread through the country. First observed in 1952 on one estate in Selangor, it has since spread to several other localities in that state and has also been found in Johore and Peark. Dissemination of the disease has been aided by the widespread distribution of pedigreed seedlings from infected nurseries.

Light attack of the disease results only in the production of numerous small leaf spots and slight stunting of the plants, but in severe infection leaf spots are very numerous, and coalescing, kill off large areas of leaf. The youngest leaves are most susceptible to infection and as a result heavy infection frequently causes the death of the seedling.

The disease is caused by a species of *Curvularia* of the *maculans* group. At least partial control can be achieved by spraying with fungicides, of which thiram and zineb appear the most promising. Copper fungicides are not recommended because they may induce leaf scorch on young oil palm seedlings.

Another disease of oil palms which has caused concern during the past few years is basal stem rot, *Ganoderma lucidum* (Leys.) Karst. This disease has been known for many years as an occasional cause of death of old palms but has not in the past resulted in serious losses. Recently, however, in one or two localities it has caused heavy mortality of about 18-to-25-year-old palms. An even more disturbing feature of the disease is the recent discovery on one estate that basal stem rot kills young palms of about eight years of age. This would appear to indicate an increase in virulence of the pathogen.

Observations suggest that the disease spreads only by spores and the main method of control advocated has been to limit the amount of inoculum present. This is achieved by felling and burning affected palms on which fructifications are freely produced, or by having pest control squads carry out inspections, collecting and destroying all fructifications of *Ganoderma lucidum* found. As the fructifications begin to sporulate in about ten days after they first become visible, these inspections must be frequent if they are to be effective. When only the older palms are affected, no other control measures are carried out, as the expense of treating such palms to save them would not be worth the cost. Where young palms are attacked, however, the effort to save them is considered worth while, and this has been done on one estate. The method used was to excise the diseased tissue and protect the cut

surface with a wound dressing. This treatment has been under trial for only a short time and it is not yet possible to say whether it will be successful.

Pineapple

Two diseases of pineapple, fruit collapse and heart rot, have been known in Malaya since 1935 and 1936 respectively. Early investigations did not elucidate the cause of these diseases and, as they continued to cause considerable losses, investigations were resumed a few years ago. Fruit collapse is capable, under conditions favorable to the disease, of causing losses of fruit amounting on occasion to more than 50 percent of the crop, and from data gathered in Malaya over a period of several years, an average loss of 10 percent appears to be a fair estimate. This disease produces a soft rot of maturing fruit, causing rapid and complete disintegration. The fruit becomes a dull olive color and copious exudation of juice occurs. Heart rot is a less serious disease, usually affecting small areas and sporadic in occurrence. The bases of the youngest leaves and the growing point of young plants are subjected to a soft, evil-smelling rot. The central leaves can then be lifted out of the heart of the plant and the growing point is completely destroyed.

Both diseases have been proved to be caused by the same species of bacteria, a strain of *Pectobacterium carotovorum* (Jones) Waldee. This strain is capable of attacking carrot, onion and other plants but isolates from such hosts are not pathogenic to pineapple. The disease has not been recorded from any other pineapple-growing country.

Control of fruit collapse at present depends on field sanitation, particularly the destruction of diseased fruits, which were in the past left in the field, thus forming centers of infection. Spraying of the developing fruits at weekly intervals with streptomycin sulphate has been found to give partial control but it has not proved economically feasible. It is possible to curb heart rot by destruction of severely affected plants. In the case of less seriously diseased plants which can recover from attack by producing new growth from axillary buds, the removal of infected leaves and spot spraying of the hearts of these plants with a copper fungicide are recommended.

Rice

In an investigation of the seed-borne fungi affecting rice, it was found that the most frequently occurring fungus was *Helminthosporium oryzae* Breda de Haan. Other fungi commonly found on rice seed were *Trichoconis padwickii* Ganguly and *Fusarium* spp. All of these fungi were inside the rice grains as well as on the surface. *Piricularia oryzae* Cav. was not found on or in any of the seeds examined, although this fungus occurs commonly on rice seedlings in Malaya. This suggests that, under local conditions, the fungus is not normally seed-borne.

Experiments carried out both in the laboratory and the field have shown that treatment with fungicidal seed dressings of fresh, highly viable seed was not beneficial, resulting in neither increase in percentage of germination nor improvement in seedling growth. Treatment of older seed of reduced viability did, however, effect some improvement in germination. Organic mercurial dusts were found to be the most suitable among the fungicides tested.

Tomato

Many solanaceous and other crops are attacked by bacterial wilt, *Pseudomonas solanacearum* (E. F. Smith) E. F. Smith and among the most susceptible plants is the tomato. Except in the cooler areas in the hills at altitudes of about 4,000 to 5,000 feet, where the disease is less prevalent, it is usually impossible to grow tomatoes unless the soil has been partially sterilized by steaming or baking.

For some years experiments have continued in Malaya in an attempt to discover a suitable chemical soil sterilant. Only one material, DD soil fumigant, has proved useful, but as results with it have been erratic and only par-

tially successful, its use against the disease has not been widely adopted. Recently it has been observed that in certain areas in Malacca, where tomatoes are grown as an off-season crop on wet rice land, bacterial wilt is much less severe than it normally is on land used only for dry land crops. As a result of this observation, experiments were initiated to discover whether flooding of the soil for a period reduces wilt incidence. As the beneficial effect of this practice was confirmed in first trials, research along this line is continuing, including a comparison of flooding alone with flooding combined with soil treatment with DD soil fumigant.

As mentioned above, at high elevations bacterial wilt is of minor importance, although it does occur there on tomatoes as well as on potatoes. At these elevations late blight, *Phytophthora infestans* (Mont.) de Bary is a more serious problem on these crops. In the case of potato, several Dutch varieties which are resistant to the disease in the Netherlands have been imported for trial. Of these, varieties Voran and Gloria have shown resistance under local conditions, and control of the disease can be achieved by growing these varieties. In tomatoes, no suitable resistant varieties have been found and control is normally achieved by frequent spraying with Bordeaux mixture at intervals of three or four days in wet weather. This fungicide is not altogether satisfactory and field trials are carried out with new fungicides as they become available. Most of the materials tested in the past were found to be less effective than Bordeaux mixture but in a recent experiment encouraging results were obtained with zineb.

Diseases and Pests of Date Palm in the Sahara and North Africa

A. Calcat, Service de l'agriculture et du paysanat du Sahara, Paris

In North Africa, cultivation of the date palm (*Phoenix dactylifera*) is confined to the desert and semi-desert regions, where ecological conditions, especially the severity of the climate with its variation in temperatures and extreme dryness, limit to a considerable extent the development of diseases and pests. Therefore, in this area the number of pests and diseases affecting the date palm is rather restricted.

Disorders of nonparasitic origin

Temperature relations

In the Sahara, disorders caused by the disturbance of physiological equilibrium of date palm are more often due to climate than nutritional causes.

Temperature seems to be the main factor that determines the annual growth cycle of the date palm. The very hardy palm is well adapted to desert climate and it appears to tolerate extremely high temperatures, often exceeding 50° C. In spring growth starts when soil temperature reaches 12° C. Palms irrigated with hot artesian water start growing earlier, as is the case in Ouargla, Department of the Oasis, where the irrigation water originates from a depth of 1,500 meters with a temperature of 59° C., and these palms may flower one month earlier than others. Growth of the palm is most vigorous when temperature reaches about 32° C. Flowering begins when temperature attains about 18° C. and, to ensure satisfactory maturing of fruits, it is necessary that before first autumn rains the total of daily mean temperatures exceeding 18° C. reach 1,500° to 1,800° C.

After many years of observation, Monciero, chief of the Date Palm Experiment Station in El Arfiane, Department of the Oasis, has established for various date varieties the sum total of daily mean temperatures

$$\left(\frac{\text{Maximum} + \text{Minimum}}{2}\right)$$

between pollination and harvest required to obtain good maturing. In the region of the Oued Rhir, this total is 6,000° C. for the fine Deglet Nour export variety, and 5,500° C. for the common Rhars variety. Monciero has also been able to establish, based on observations over a period of three years, that for the pollen to attain maturity and satisfactory germinating power in El Arfiane, the total of mean daily temperatures, between 1 January and the opening of the male flower, must reach 1,200° C.

Cold

The vegetative parts of the date palm are very resistant to cold. During winter, in certain parts of the Sahara, temperature declines to -10° C. without causing apparent damage to the trees. Extremely low temperatures, -12° to -15° C., cause wilting of the palm without killing it and normal growth is resumed afterwards. On the other hand, the flowers are much more sensitive to cold, as was experienced in 1956, when a warm January was followed by an unusually cold February. During that year it was observed at Ouargla that female flowers which had opened, froze and withered rapidly when temperature dropped to -2° and -5° C. But this severe cold caused only part of the damage reported. When male flowers opened, the required total of 1,200° C. for proper pollen germination was not attained, and it was forecast that early flowering varieties such as Rhars, Timjouart and Tin Naceur would not be pollinated. Consequently, in 1956, palms of these varieties

produced 30,000 tons of dates less than in normal years in Algeria and the Sahara.

To remedy this situation, Monciero has made efforts during the last ten years to develop early-maturing male palms through crossbreeding. Present results are promising but it seems that another ten years of work will be required to obtain the desired effects.

In colder years, when the total of daily mean temperatures fails to reach the required minimum for adequate development of fruits before autumn, when the first rains start, fruits do not attain maturity on the trees. Ripening must be completed on hurdles, which involves costly manipulation ; the dates do not dry well and remain watery, as was the case in 1957. If farmers do not have adequate storage facilities, the fruits will remain on the trees, where they are subject to attacks by various molds, and rot rapidly if rain falls. On the latest-maturing varieties, such as Deglet Nour, losses may reach 25 to 30 percent during unfavorable years.

Rainfall

Contrary to general belief, rain in the desert is nearly always detrimental to crops, although it favors the growth of pasture plants. Spring rains may wash off pollens of opened male flowers of date palm. If rain occurs within two hours after pollination, it may also wash away pollens from female flowers, as happened in Ksar-Es-Souk, Morocco, in 1956. The resultant increased humidity from rain also favors the development of parasitic diseases of the flowers, especially the " khamedj " disease caused by *Mauginiella scaettae* Cav. Autumn rains contribute to rotting of fruit on trees, particularly when the fruits are in heavy compact clusters.

Rains may also be the cause of high salt content in the upper layers of the soil, by dissolving the salt accumulated on the surface, due to intensive evaporation. This happened in 1955 in central and southern Sahara. At El Golea and in the Tidikelt, a number of palms died within a few days because the salt content of ground water became too high.

Soil salinity

Due to the high osmotic pressure in the roots, the date palm is quite tolerant of high soil and water salinity. Systematic trials carried out at El Arfiane proved that palms irrigated with water containing no less than 1.2 percent and up to 2.5 percent salt during summer (half in the form of chloride) grew and produced fruits. However, excessive salt concentrations are harmful and it can be observed that in the lower saline parts on the border of palm groves, palms do not grow because of the high salt concentration in the soil.

Nutritional deficiency

Some disorders in growth and fructification are probably due to nutritional deficiency but none has yet been proved. A fruit deformation characterized by a wide furrow, 4 to 5 millimeters deep, girdling over half the median circumference of the date, seems to be attributable to a copper or rather iron deficiency.

Water deficiency

Good date palm groves which depend on ground water have been found to decline in vigor and production and even die, due to the gradual lowering of the ground-water level and consequently the reduction of water available. This often happens in the Upper Oued Rhir, where dead palms are prevalent in groves. The withered stem decreasing in diameter toward the tip clearly indicates progressive decline.

Bayoud disease

Bayoud disease, caused by *Fusarium oxysporum* var. *albedinis* (Killian & Maire) Malençon, is extremely serious. It was first observed in the Dra Valley, north of Zagora in Morocco, from where it has progressively spread toward east and west.

About 80 years ago, the palms of Oued Ziz were infected ; in 1890 the disease occurred at Bou Denib in the high Valley of Oued Guir ; in 1898 it had reached Figuig in the high Valley of Zousfana at the border of the Algerian

Sahara. Then it spread to the western and central parts of the Algerian Sahara in the following sequence :

Western part :

Zousfana and Saoura Valleys : Beni Abbes, 1908 ; Tarhit 1923.
Gourara area : Fatis, 1912.
Touat area : Adrar, 1923.

Central part :

Tidikelt area : Sillafene, 1910 ; Hassi El Hadjar, 1940 ; In Salah, 1945.
Pays Chaamba area : Metlili, 1958.

The spread of the disease, although slow, appears to be relentless and may be accelerated in the future as a consequence of improved means of transportation. It has been proved in the experimental plots of the Agricultural Service at Tiji (In Salah) that the date variety Deglet Nour is susceptible to bayoud disease.

Figure 1. A date palm of variety Deglet Nour killed by bayoud disease (*Fusarium oxysporum* var. *albedinis*) in the experimental garden at Tiji, In Salah.

Should the disease be introduced into the privileged date-growing areas of Ouargla, Oued Rhir, Souf, Ziban, it could prove economically disastrous.

Symptoms

Bayoud disease manifests itself on a single leaf in the center of the frond. One side of the affected leaf dries and curves, so that the pinnae on that side are closer together. The leaf then assumes a characteristically arched shape, as witnessed by the diseased specimen. Infection starts at the base of the leaf and follows the rachis on one side upward to the tip, and then descends on the other side where the pinnae dry consecutively in the opposite direction. This process takes a few days to many weeks. The disease then spreads to other leaves and extends gradually over the whole frond. The terminal bud stops growing and the palm dies. The time required for the progress of the disease until the palm is killed varies considerably and may take from one month to some ten years.

On the underside of the rachis of the diseased leaf, brown depressed streaks extend over its entire length. A section of the rachis shows reddish necrosis and a microscopic examination reveals hyaline mycelium in the vascular bundles and adjoining parenchyma. Microconidia, which usually measure about $3 \times 5 - 10\ \mu$, are grouped in the vascular bundles or in cells and are rarely found isolated. In cultures the fungus may produce microconidia but this is rather exceptional.[1]

Disease cycle

Infection may take place through the flowers but usually occurs through the roots in contaminated soil. The mycelium then grows through the stem up to the leaves. From one orchard to another transmission is effected by means of infected parts of palms, such as wood, rachis, or manufactured products of palm origin, such as mats, ropes and frames of dromedary packsaddles.

High humidity favors the development of the fungus. Its growth is arrested at temperatures below 7° C. and above 37° C. It grows moderately at temperatures from 7° to 12° C.

[1] Péreau-Leroy, P. 1958. Le palmier dattier au Maroc. Inst. français recherches fruitières outre-mer, Paris.

and notably between 18° and 32° C., the optimum being between 21° and 27.5° C. Therefore, the disease causes most serious damage in irrigated plantations during summer.

CONTROL

Despite intensive research, no control method is known. Cultural practices, especially reduction of irrigation to a strict minimum during the hot season, may deter the progress of the disease but not stop it.

Rigorously applied quarantine measures may prevent the invasion of disease-free oases by the disease. To this end, certain areas of the Sahara have been declared infected and it is prohibited to transport palm shoots, parts of date palms including dates, and articles manufactured from palm from these areas. Shipments of dates and palm products intended for export to outside the Territory of the Sahara must be accompanied by a circulation permit.

The only effective preventive measure known to date is the growing of resistant varieties. Unfortunately, the dates produced by resistant varieties are not of a quality comparable to that of the best North African varieties, namely Mahdjoul for Morocco and Deglet Nour for the Sahara, Algeria and Tunis. Observations made in groves affected by bayoud show that there is a great difference among palms in their susceptibility to the disease. Some clones are very susceptible, while others are more or less resistant, and still others immune. Based on these observations, the first nursery of resistant varieties was established in Ksar-Es-Souk (Morocco). Such nurseries were subsequently set up in the Sahara in oases of the Touat, Tidikelt and the Saoura.

For the moment, the most that can be accomplished is to breed new strains combining *Fusarium* resistance and good date quality. Unfortunately, early success is unlikely.

Khamedj diseases

All diseases causing rot of male and female inflorescences, clusters and the terminal bud are known as " khamedj " to farmers of the Sahara. Among them, the inflorescence rot caused by *Mauginiella scaettae* is best known.

Mauginiella scaettae, which attacks the inflorescence, is found on sick, neglected trees growing in waterlogged soils, lowlands, and salty basins. Brown spots appear on the spathes ; when the flower on the affected pedicle opens, it drops. The disease may also be favored by abundant spring rains.

Elimination of infected inflorescences reduces the source of infection. Lime sulphur spray and Bordeaux mixture gave good results in control, as did dusting with a mixture of one part copper sulphate and three parts lime.

The terminal bud of the palm may also be attacked by a rot, which is fatal to the palm but rather unusual in desert areas.

Early rains preceding the harvest, during which time the fruits ripen and have a high sugar content, create favorable conditions for the development of all kinds of molds which rapidly destroy the whole cluster.

Pruning the clusters after fruit setting, a practice among progressive farmers to increase the size of fruits by reducing their number, is most satisfactory in preventing rot. It consists of cutting off one third of the terminal cluster, to permit better aeration and rapid drying after rain.

Belaat disease

Belaat disease, which attacks the foliage and is generally prevalent on less vigorous trees, is caused by a species of *Phytophthora*. It is of rare occurrence and does not usually assume epidemic proportion. On an affected tree the whole crown is discolored and the terminal bud is often completely lost. After removing the diseased parts, growth frequently starts from one or more latent buds which replace the terminal bud and form one or more new crowns. On the trunk, strangulation persists at the level where the damage has occurred.

Birds and domestic animals

Sparrows are numerous in the oasis. They devastate grain crops, then attack the ripe dates, pinching and damaging the best fruits on the surface of the cluster. As the sparrows

are bold and destructive, they soon discover that even the sound of scarecrows is harmless. Destruction of their nests is the most efficient control method. Baits poisoned mostly with glucochloral products are effective when applied skillfully for the first time, but the sparrows soon become suspicious. Hunting the birds with rifles is less effective, for after a few days they will keep away from the hunter and continue to cause damage.

Starlings are migratory birds which arrive in great numbers and may cause severe damage in date palm groves. They can be controlled by the same methods used for sparrows but are less harmful and slower in their reaction to danger.

Domestic animals in the oasis are fond of dates and must be kept away from the groves before harvest.

Insect pests

DATE PALM SCALE

The date palm scale, *Parlatoria blanchardi* Targ., which measures about 1 millimeter in diameter, infests pinnae, leaves, clusters and even fruits of the date palm. They are at times sufficiently numerous to cover the tree almost completely. According to W. Smirnoff, a palm of average size may harbor 180 million of the scales.

Indigenous to Iraq, the date palm scale attacks specifically date palms in the desert. Its distribution areas coincide closely with the areas where dates mature naturally. It has spread in the same way as the date palm but some centuries later. It was carried from one oasis to another on palm shoots or infested dates loaded on caravans. The introduction of this scale into western North Africa is age-old but not precisely known. Its recent spread into new areas, however, has been observed carefully. It appeared in the Touat in 1912; in Colomb-Bechar in 1920; the Tidikelt in 1928; the Saoura in 1930; Figuig in 1937; Tafilatet in 1938; Bani in 1941 and in Goulmina in 1951. Even in areas which had been contaminated in former times, there are now still isolated oases free from this pest, as in Tassili des Ajjers.

The date palm scale, by feeding on the leaves, causes reduced physiological activity and possibly inoculates them with toxic matter.

Figure 2. Date palm scale (*Parlatoria blanchardi*) on date palm leaf. × 2

This scale can be controlled by flame throwers, fumigation with hydrocyanic acid, spraying with oils, with the addition of phosphorous ester insecticides, but all these methods are costly and involve risks. Therefore, biological control measures are preferred. Among the predators, *Cybocephalus* spp. are the most important, constituting about 75 percent of the predator population. *Pharoscymnus* spp. account for about 20 percent, and the rest of the population is composed of species of *Scymnus* and *Chrysopa*.

Cybocephalus species are tiny black beetles measuring 0.7 to 1.5 millimeters. *C. palmarum* prevails in the Sahara area, and *C. dactylus* and *C. flaviceps* are found mostly

near salty swamps and dried river beds. The three main species of *Pharoscymnus* that feed on the date palm scale in North Africa are *P. numidicus*, *P. setulosus* and *P. ovoideus*.

Date mite

Date clusters are sometimes covered with white-grayish filaments resembling spider webs, that extend from one date to another. Under this web there is a yellowish mite, *Paratetranychus simplex* (Banks), measuring 0.2 to 0.3 millimeter in length. This mite is found all over North Africa. The infested dates exude a gummy liquid, become malformed, crack and dry, and are unfit for consumption. Entire clusters may be destroyed.

In the Sahara the occurrence of this mite in the spring is carefully recorded at the El Arfiane Experiment Station and announced via newspaper and radio. The initial outbreaks are easily controlled with a dust containing 25 percent sulphur and 75 percent sifted lime.

Insects of fruit

Ripe dates may be attacked by many insect larvae. One of the most widespread is *Myelois decolor* Zett., a pest of maturing or mature dates. The biology of this species has been studied but is not yet completely understood. The insect undergoes three to four generations a year but only the two last generations develop on dates. It overwinters in its larval stage. Whenever there are no mature dates available, the larva, which is polyphagous and even cannibalistic, feeds probably on the refuse of plant or animal origin rich in nitrogen. It has many natural enemies which limit its incidence.

The number of infested dates in a grove averages 5 to 10 percent but may exceed 12 percent in years and places favorable to the development of this pest. Spraying the clusters with lindane from the beginning of ripening can keep infestation down to about 1 percent.

After harvest, dates must be fumigated with methyl bromide or ethylene oxide, otherwise 25 to 80 percent of the dates or even the whole batch may become infested in storage. There are other insects, such as species of *Ephestia* and *Oryzaephilus*, which also attack stored dates.

Other insects

The stems and trunks of date palm sometimes show holes of varying diameters which are galleries of wood borers. This type of damage, mostly caused by *Apate monachus* F., is rare and is found usually on weakened trees. If this pest is to be controlled, volatile insecticides, such as paradichlorobenzene or carbon bisulfide, should be introduced into the galleries.

Desert locusts, *Schistocerca gregaria* Forsk., especially flying swarms, can cause severe damage. They feed on palm leaflets, damaging mostly the isolated or border trees of a grove. Sometimes they also attack the young clusters, feeding on fruits.

Weeds

Cogongrass, *Imperata cylindrica*, is found sporadically throughout the Sahara and is particularly abundant in the Ziban.

It is propagated by creeping rhizomes and seed. Its dense and vigorous root system penetrates into the soil at a depth of more than 1 meter. The grass roots bore through the roots of date palms, much in the same way as the rhyzomes of *Cynodon dactylon* bore through potato tubers, or they follow the palm roots to pierce through under the bark. The affected palm roots are usually killed.

In the Tolga region, palms have been found to have lost three fourths of their roots. Such palm trees starve and wilt and the leaves show a characteristic yellow color. The writer observed the same effect also in Israel in the surroundings of Tiberiade and north of Eilath.

To eliminate this weed, the food reserves of the subterranean parts must be exhausted by continuously cutting off the aerial parts as soon as they are developed. Trials with herbicides have been under way but no conclusive results have been obtained. Such trials require much care because the irrigation water is often used again.

OUTBREAKS AND NEW RECORDS

PHILIPPINES

Tiburcio T. Reyes, Department of Plant Pathology, College of Agriculture, University of the Philippines, Laguna

Ring spot disease of coffee

Ring spot disease was first observed in August 1957 on a few Arabica and Excelsa trees in the coffee plantation of the College of Agriculture and Central Experiment Station, Laguna. In April 1959, the disease was already prevalent in this plantation, affecting not only Arabica and Excelsa trees but also Robusta and Liberica coffees. Infection was very severe on the first three species mentioned.

The disease affects seedlings as well as bearing trees and attacks leaves, fruits, stems and twigs. On leaves symptoms appear first as translucent spots with a yellowish border. The spots are more or less circular, varying from pinhead size to 1.5 centimeters or more in diameter and have single, concentric or incomplete necrotic rings. They may coalesce, forming large lesions. In the center of the spot a ring encircles the apparently normal tissues (Figure 1). On the fruits the spots vary from 1 to 5 millimeters in diameter, appearing more or less round and depressed. They appear first as concentric chlorotic rings, with apparently healthy tissues in the center which eventually die, becoming brown and sunken. Some spots coalesce, forming larger lesions and subsequently the whole fruit turns black.

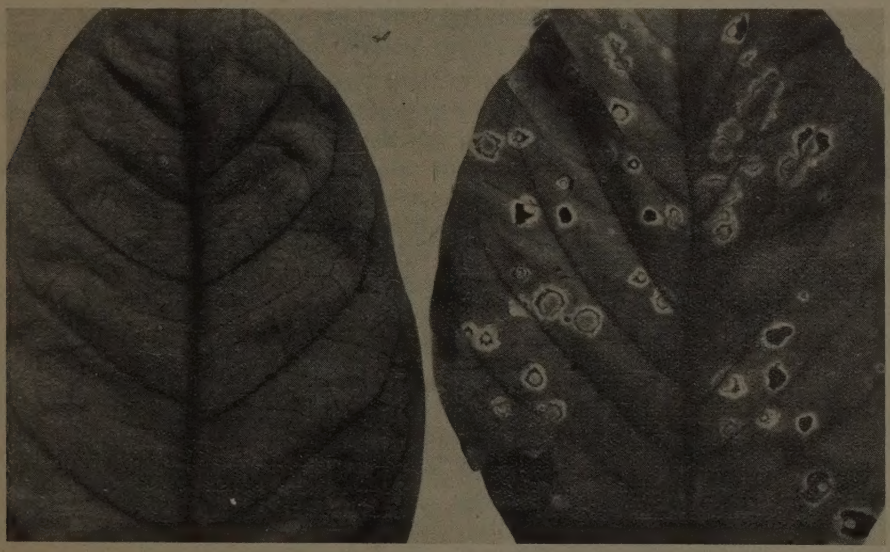

Figure 1. Ring spot of coffee in Laguna, Philippines. Right, a leaf showing typical symptoms; left, a healthy leaf.

Diseased trees produce few fruits which are generally smaller than those from healthy trees.

Spots similar to those on leaves and fruits are found on green stems and twigs of Excelsa trees. The lesions are irregular in shape, brown and slightly depressed. Stems and twigs of

diseased trees in general have shorter internodes and scaly bark.

Observations and experiments conducted in the laboratory, greenhouse and field, appear to indicate that the disease is identical with coffee ring spot disease reported by A.A. Bitancourt [1] in Brazil, or the coffee blister spot described by F. L. Wellman [2] in Costa Rica, which is of virus origin.

Isolation and microscopic examination of diseased plant tissues failed to reveal any bacteria or fungi which were in constant association with this disorder. There was no evidence of any insect attack which might be the cause. On the other hand, transmission of the disease by grafting has been demonstrated. Forty-two healthy coffee seedlings grown in pots in the greenhouse were grafted by inarching to diseased orchard trees. After six months, 34 of the seedlings showed typical symptoms of the disease. Attempts were unsuccessful to transmit the disease by rubbing sap of diseased plants on leaves of healthy *Coffea arabica*, *C. dewevrei* var. *excelsa*, *C. liberica*, *C. canephora*, *C. stenophylla*, *C. abeokutae*, pepper, tomato, cucumber, squash, beans and cowpea. Seedlings grown from seeds collected from diseased trees did not show symptoms, indicating that the disease is perhaps not seed-borne.

[1] BITANCOURT, A. A. 1939. Lesoes nas frutas de mancha anular do cafeeiro. *Biologico* 5 : 33-34.

[2] WELLMAN, F. L. 1957. Blister spot of Arabica coffee from virus in Costa Rica. *Turrialba* 7 : 13-15.

UNITED STATES

Plant Pest Control Division, Agricultural Research Service,
United States Department of Agriculture

NEW INSECT RECORDS, JANUARY-SEPTEMBER 1959

A thrips, *Haplothrips clarisetis*, was reported in California in March and later described as killing lettuce in New Mexico.

An olethreutid, *Laspeyresia fletcherana*, was found infesting bark of Douglas-fir in Montana during autumn of 1958 but the record was not reported until May 1959. This pest has been known to occur in Canada for many years.

A May beetle, *Phyllophaga bruneri*, was discovered in Miami, Dade County, Florida, during late June. The adults were found feeding on several hosts. Before this record in Florida, this species was reported only from Cuba.

A root aphid, *Tetraneura hirsuta*, was found on rice at Belle Glade, Florida, in late May. The species is widely distributed in Asia and Africa on various grasses. As far as is known, its economic importance has not been determined.

Apanteles galleriae, a parasite of wax moth (*Galleria mellonella*), was reported from North Carolina in July. These parasites caused a marked reduction in the wax moth population in a Polk County bee yard during September of 1958. These are the first specimens collected in North America.

A pyralid, *Agossa pinguinalis*, a potential pest of grains, was reported from Massachusetts during August. Specimens have been collected in several localities of the state, the first on 14 July 1959.

Specimens of a katydid, *Meconema thalassinum*, were collected on Long Island, New York, on 12 and 14 July and announced in September. The species inhabits nearly all of Europe and is not known to be of economic importance.

Specimens of an ant, *Prionopelta* sp., were collected during August in Florida, representing the first species of this genus to be found in the United States.

A bostrichid, *Sinoxylon conigerum*, was collected boring in sapodilla 8 to 10 feet tall at Miami, Dade County, Florida, in August. The insects apparently killed the tree. This species has been intercepted at ports of entry many times, but this report seems to be the first record of its establishment in the United States.

STABILIMENTO TIPOGRAFICO F. FAILLI - ROMA

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